www.wvara.org April 2018

The Heterodyne

Newsletter of the West Valley Amateur Radio Association

April Meeting

CWOps
by Rob Brownstein, K6RB

Wednesday, April 11
Meeting Starts at 7pm

Meeting Location:
American Red Cross,
Silicon Valley Chapter
2731 N. First Street at Plumeria Dr
(southwest corner) in San Jose

WVARA Repeaters (W6PIY)

Band	Frequency	PL
6 Meters	52.580- MHz	151.4 Hz
2 Meters	147.39+ MHz	151.4 Hz
1.25 Meters	223.96- MHz	156.7 Hz
0.70 Meter	441.35+ MHz	88.5 Hz
0.23 Meter	1286.2- MHz	100 Hz

Club Net

WVARA's club net is on the W6PIY repeaters each Tuesday at 8:30 pm. All repeaters are linked together during the net. The net script can be found at www.wvara.org/net.html .

Visitors Are Welcome!

President's Letter

April has always been a playful month for me. April Fool's Day, Spring Break vacations, and the scent of spring in the air just puts me in a fun mood. With that, this month's letter will be a bit less serious as we take a look at Ham radio in culture. Sometimes it's mocked, sometimes revered, sometimes magical, but mostly it shows up with a good ol' dose of self-sufficient know-how and can-do attitude. To me, that's fun!

Here are some great examples. 73, Bobby K0XI

Andy Hardy (movie)	This was the first known time ham radio appeared on the big screen, where Mickey Rooney makes a call to Canada to get a message through for a family member.	

Frequency (TV)	This is where an NYPD detective communicates with his deceased father over ham radio. I wonder if he got a QSL card. I also found it humorous that it was aired on the CW network.	
Last Man Standing (TV)	Tim Allen played KA0XTT, a director of marketing, with a ham shack at home. In real life, 7 of the production assistants got licensed because of interest on the set, Tim Allen included (W5KUB).	KA0XTT 4024 Radford Ave. Bungalow 17 Studio City, CA 91604 Watch lastmanstanding Fridays at 8pm/7c on abc
Independence Day (the first movie)	The best part, of course, is when the response to an alien invasion is coordinated entirely with Morse code – on straight keys no less.	
The Simpsons (TV)	Ham radio has been used in 6 different episodes, where it seems most of the residents of Springfield get on the air at one point or another.	
The Family Guy (TV cartoon)	Who doesn't like a ham radio shop named after Bill?	BILL'S HAM RADIO HUT, Est. 1934 WE HAVE OTHER STUFF TOO T.V.

The Munsters (TV)	Who doesn't enjoy Herman's antics?	
Burger King (TV commercial)	Not sure how this fits with the "amateur" side of things, but any day a chipotle chicken sandwich can be ordered through an IC-718 is a good day in my book.	

Meeting Topic

CWOps - Rob Brownstein (K6RB)

Hello Everyone!

It's time for our April WVARA meeting. Please join us this Wednesday (April 11th) at 7 pm in Meeting Room 5 at the Silicon Valley Chapter of the American Red Cross, 2731 N. First Street at Plumeria Drive (southwest corner) in San Jose.

Most of us come in through the side entrance on the southwest side of the building — look for our red WVARA sign on the side where they park all the Red Cross trucks. Cookies will be served, and of course, visitors are welcome! If you haven't been to the Red Cross, "talk-in" is usually available on the Association's repeaters; 2m/220 are good choices, and our 6-meter machine is working pretty well these days I hear!

At the beginning of the year, we asked "What is your amateur radio-related new years resolution?" and several of us (including myself) answered that 2018 was the year to get into CW.

Learning CW can be intimidating, though; you might tune to the CW subbands on one of these contest weekends and hear a blur of dits and dahs at 45+ WPM and wonder if anyone could possibly be decoding or sending at that speed.

Our guest might be able to help with that: Rob Brownstein (K6RB) is one of the founding members of CWOps and the CW Academy. CWOps is a club of CW operators that sponsors a weekly CW contest that occurs every Wednesday at three different times. CW Academy is a program put on by the CW Operators' Club aimed at increasing the number of competent CW operators on the HF CW sub-bands. It addresses all levels of enthusiasts: from those aspiring to become licensed operators who want to learn and use Morse code; to veteran operators who are intent on increasing their CW skills, speed and activity.

Rob Brownstein, K6RB, was first licensed at age 11 as KN2UMU in New York City's borough of Queens. He has maintained a consistent level of operational activity for 56 years. His preferred operating mode is CW and he spends nearly 99 percent of his time ‘pounding brass.’ His preferred activities are rag chewing and contesting with CW.

Bobby (K0XI) will also talk about Back Country Weekend at Henry Coe State Park, it’s not too late to get involved. Our May meeting will be dedicated to All Things Field Day.

A few of us usually meet for dinner somewhere near the Red Cross around 6 pm prior to the meeting and anyone is welcome to join. This month we’re going to go back to Dish’n’Dash just a block down the street: https://www.yelp.com/biz/dish-n-dash-san-jose

Don’t worry, we’ll keep Panera Bread in the rotation, and if Dish’n’Dash isn’t your first choice, there will likely be a few still going to Panera, just ask on the repeater.

Hope to see you there!

73, Bill/W9KKN

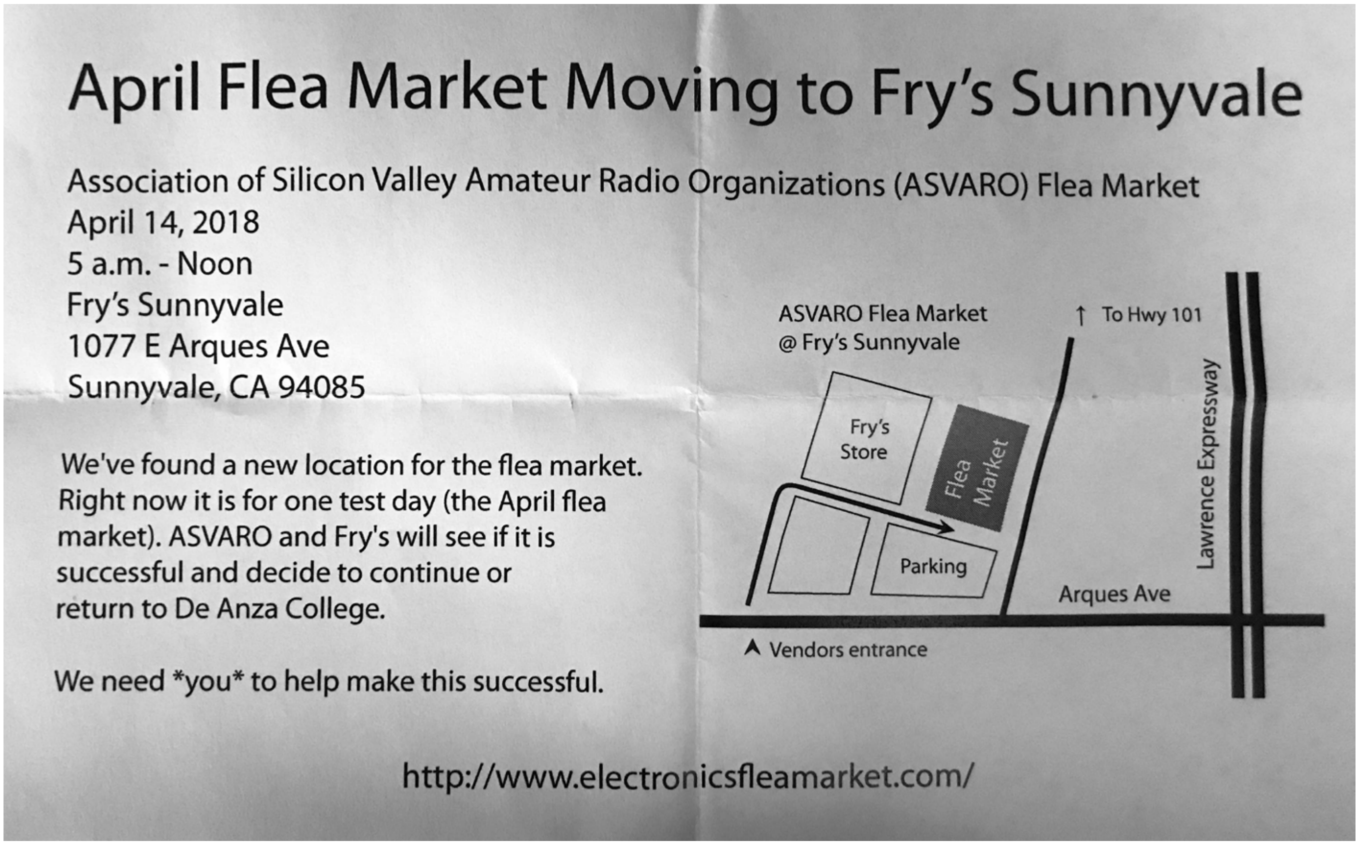
New Members

The following new members joined WVARA recently:

John Burke AJ6BJ

Kartikeya Gupta KJ6TMQ

Welcome!!!



April Flea Market Moving to Fry’s Sunnyvale

Association of Silicon Valley Amateur Radio Organizations (ASVARO) Flea Market
April 14, 2018
5 a.m. - Noon
Fry’s Sunnyvale
1077 E Arques Ave
Sunnyvale, CA 94085

We've found a new location for the flea market. Right now it is for one test day (the April flea market). ASVARO and Fry's will see if it is successful and decide to continue or return to De Anza College.

We need *you* to help make this successful.

http://www.electronicsfleamarket.com/

73,
Dave Schultheis, WB6KHP

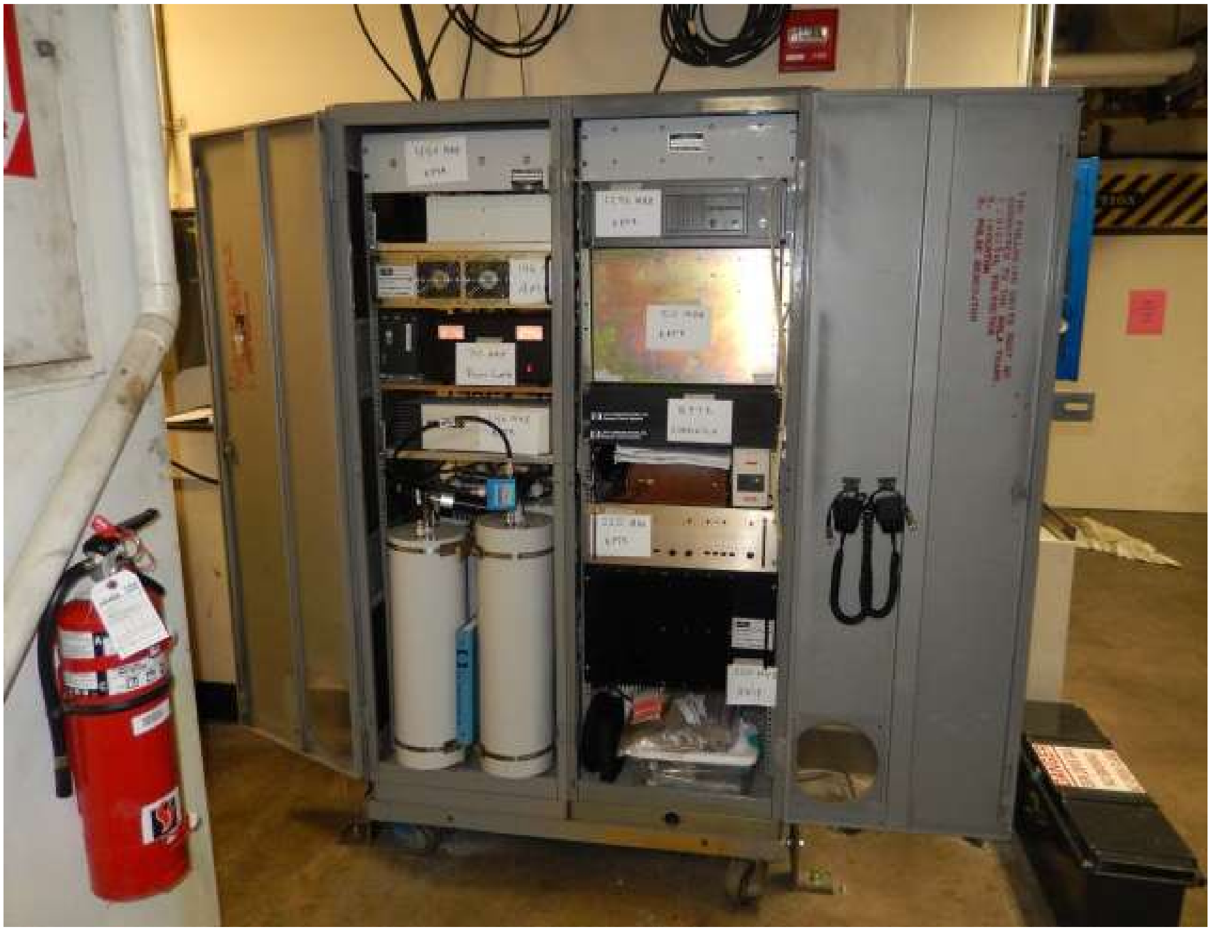
WVARA Net Check-Ins (W6PIY)

Tuesdays at 8:30 PM

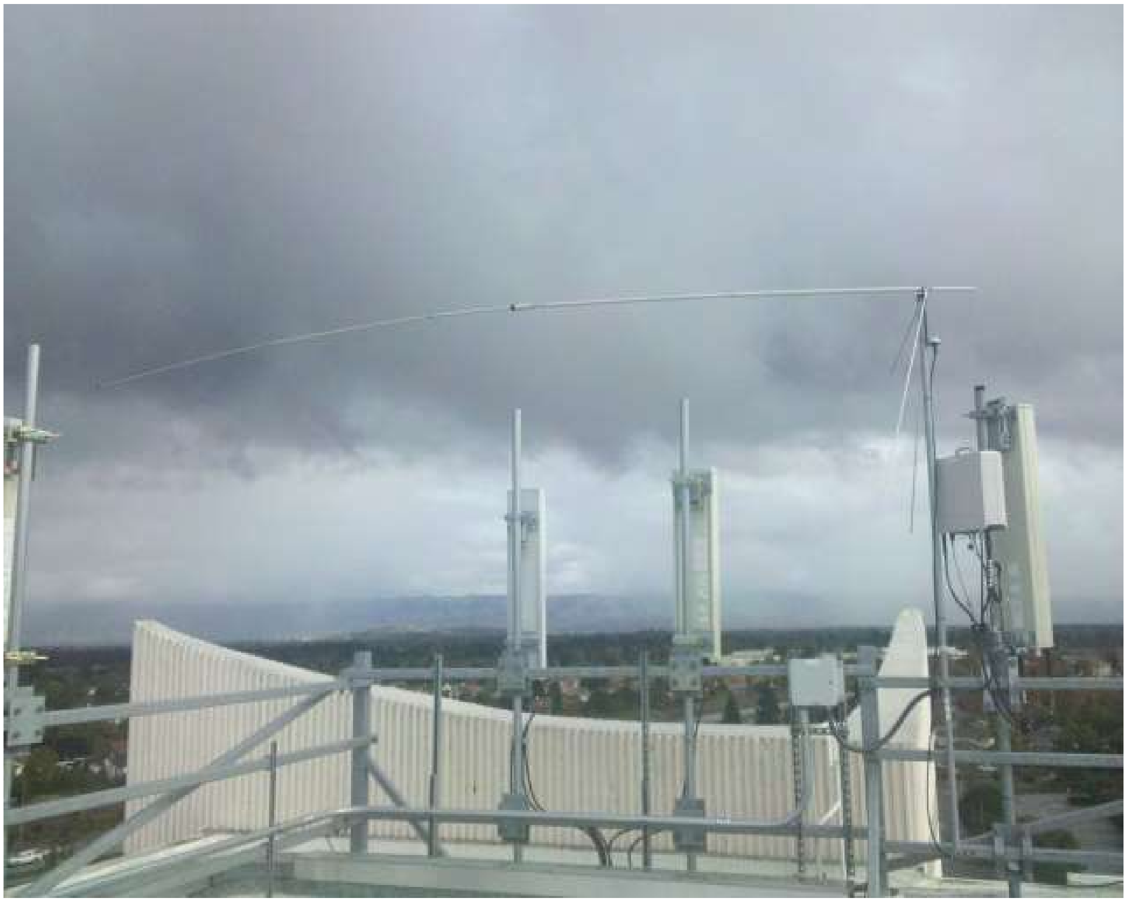
Call Sign	**Name**	**3/13/18**	**3/20/18**	**3/27/18**	**4/3/18**
Total		**16**	**21**	**11**	**16**
AA6RB	Roy		X		
AB6XS	Kevin				X
AE6JV	Bill	X	X		X
AF6AE	Bill	X	X	X	
AG6YO	Kevin	X	X	X	
AI6NT	Henry	X	X	X	X
AJ6BJ	John			X	
K0FRG	Bob	X	X		X
KE6MT	Rex	X	X	X	X
KE6ZOV	Scott				X
KF6EMB	Svend	X	X	X	X
KG6AF	Bob		X		
KI6SLX	Peri	X	X		X
KJ6WH	Brian		X	X	X
KJ6ZZI	Michael	X	X		X
KK6VF	Kevin	NET	NET	NET	
KM6GVO	Eric		X		
KM6PEA	Steve	X	X	X	X
N5YJZ	Clay				X
N6FFC	Bill		X		
N6FYR	Matt	X	X		
N9CU	Andy			X	X
NU6P	John	X			
W6IA	Mark	X	X	X	
W6MNL	Steve				X
W6PK	Phil	X	X		
W9KKN	Bill				X
WB6KHP	Dave	X	X		NET
WC6YJ	Clay		X		

6 Meter Duplexers by Kevin, KK6VF

It was December 29, 2012, a dark and dreary afternoon when Dave (WB6KHP) let me know the 6 meter repeater had gone off the air. As it wasn't currently raining and the wind had died down quite a bit, I decided go to the repeater site and take a quick look. The other 4 repeaters were on the air and seemed to be functioning normally so it wasn't a simple power problem. For those who've not seen the repeater (which is most), here is a picture.



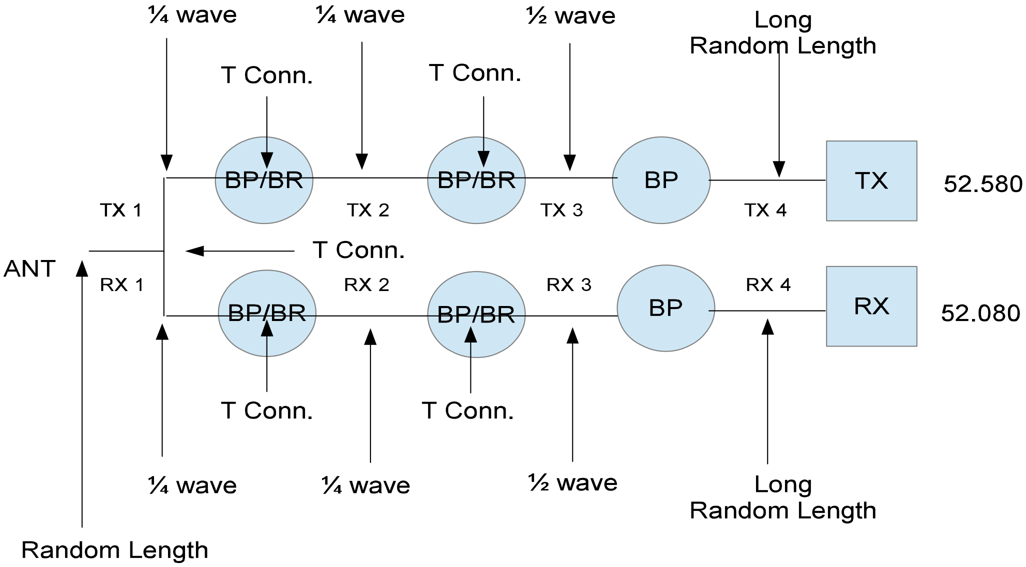
After a few tests, it was discovered our SWR was around a Zillion:1. Just a bit higher than what we usually like to see. This meant a trip to the roof to inspect the coax, connections, and antenna. As it had been raining for a few days, the first suspect was water intrusion but what I found was this.



Our 6m antenna had shifted slightly from the vertical position to the horizontal position. We assume this was from the high winds of the night before (it does get a bit breezy on the hospital roof). After a bit of hasty work, first to "make safe" the failed antenna, and second to replace it with my ¼ wave 6m ground plane we tried to bring up the 6m repeater again but with no success. It seemed there were a couple of other problems needing to be sorted out.

Time for the "big guns". I borrowed Chuck's (AD6CL) analyzer and found our duplexers were no longer "duplexing". Specifically, the reject notches for both the transmit and receive sections were no longer "deep" enough to keep the transmitter output power from reaching the receiver input. As such, the repeater would "kerchunck" itself constantly with a very large amount of desense. This was the beginning of the battle to get the 6m machine back on the air. We now knew what was wrong, but we didn't know why. Just to get a sense of what a 6m duplexer looks like, ours are 5 feet tall (not counting the tuning rods and cabling. There are a total of 6 "cans" wired in 2 groups of 3 each. One group for transmit (52.580), the other group for receive (52.080).

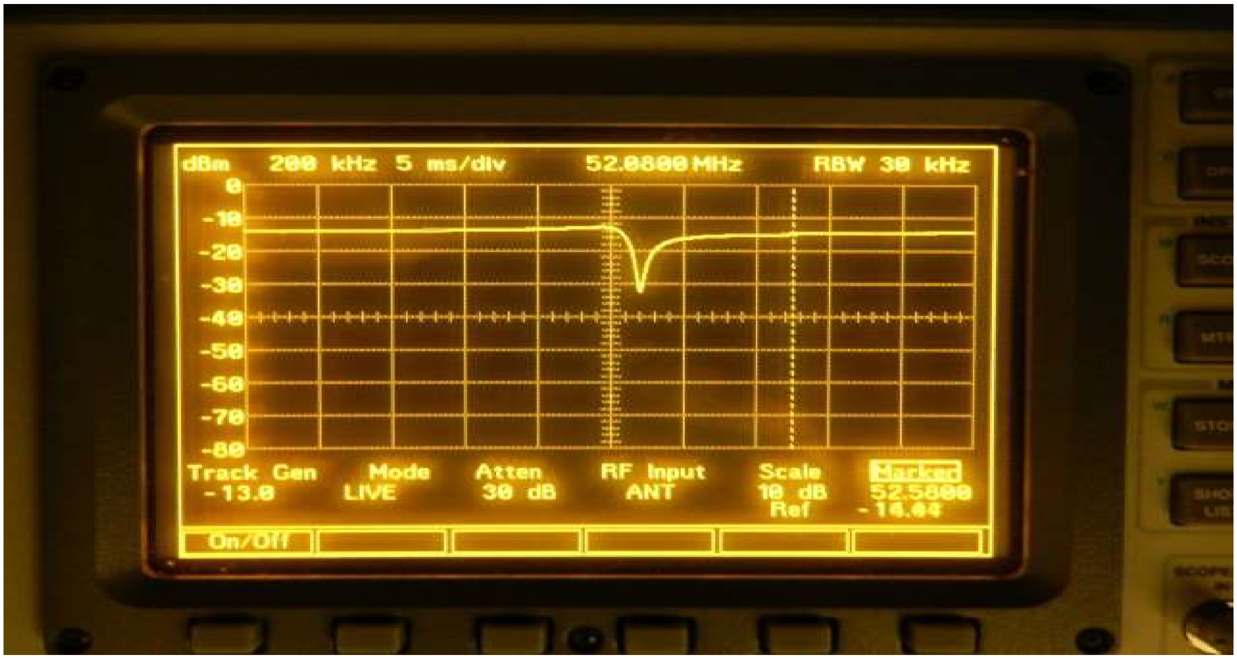
They are wired using pieces of coax of a specific length (interties) to make a tuned circuit which provide a greater value when summed than their individual components provide.



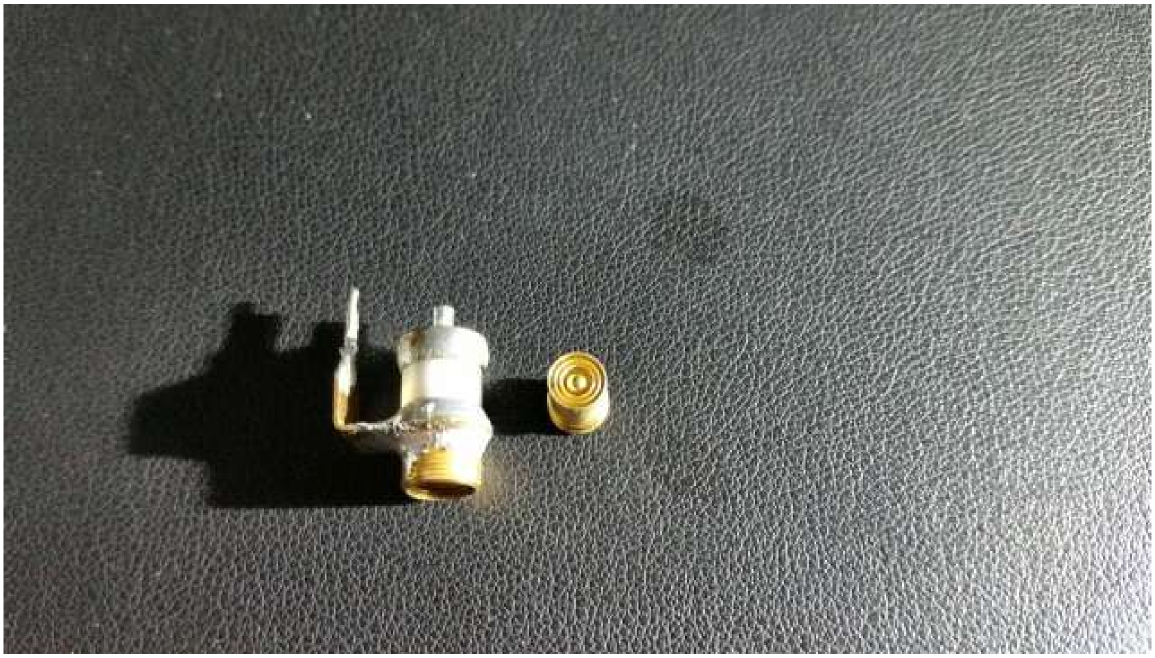
BP = Band Pass - Used to filter out wide band noise.
BP/BR = Band Pass/Band Reject - Used to pass one frequency and reject another at some offset.
Intertie = The “tuned” coax segments (¼ wave, ½ wave) connecting the cans together.

The cable intertie problem:
Our cable interties were made using LMR400 coax which is nice coax but it has a flaw in it design when used in this particular application. Due to a process called galvanic corrosion (where two dissimilar metals are in contact - in LMR400's case the tin braid and aluminum foil), over some time (years) the braid/aluminum contact points can become diodes and introduce noise in the duplexer system which can be heard as a “crackling” sound over the air. In nearly all coax installations, this is not a problem but duplexers are a special case. Usually, you transmit OR receive. Duplexers do both at the same time, hence the special case. Knowing these had to be replaced, we had to figure out what length they had to be. As you can see from the diagram above, they are part of a tuned circuit and needed to be a certain wavelength, based on frequency. What we did not know was if our “cans” included the length of the “loop”, the “T” connections, the length of the coax, and/or some other parameters (either combination or separately). After a number of experiments, we found we just needed to be concerned about the coax and “T” connections (or to be more precise, ½ of a “T” connector). Also, we discovered the published “nominal” velocity factor of our RG-214 did not match the published spec. Well, that's not quite a fair statement. It did meet the spec, but was on the high side of the +- tolerance factor. This turned out to to mean our cables' mechanical length was off by 4MHz compared to the desired electrical length. As I said, the intertie cables can be a bit tricky (considering it's just coax). To give a sense of the difference in coax types, LMR-400 flex (stranded copper center, with an aluminum foil wrap covered with a tin plated copper braid) runs about $1.00/ft. This was replaced with RG-214 coax (stranded copper, silver plated inner conductor with a double braided, silver plated outer shield) which runs about $10.50/ft (about 10x more expensive). And because the RG-214 coax is slightly larger in diameter, the “standard” RG-8 type connectors would not fit, so these had to be special ordered (also silver plated).

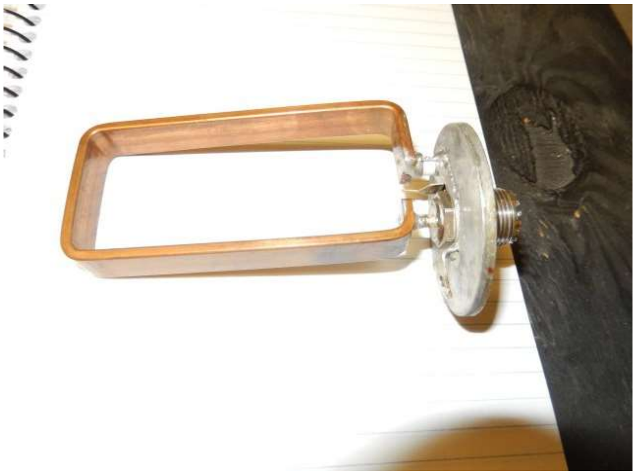
For our 100w transmitter, the reject notches needed to be better than -100db. Ours was now slightly short of that goal at around -32db. Not only that, we could not get to the target frequency.



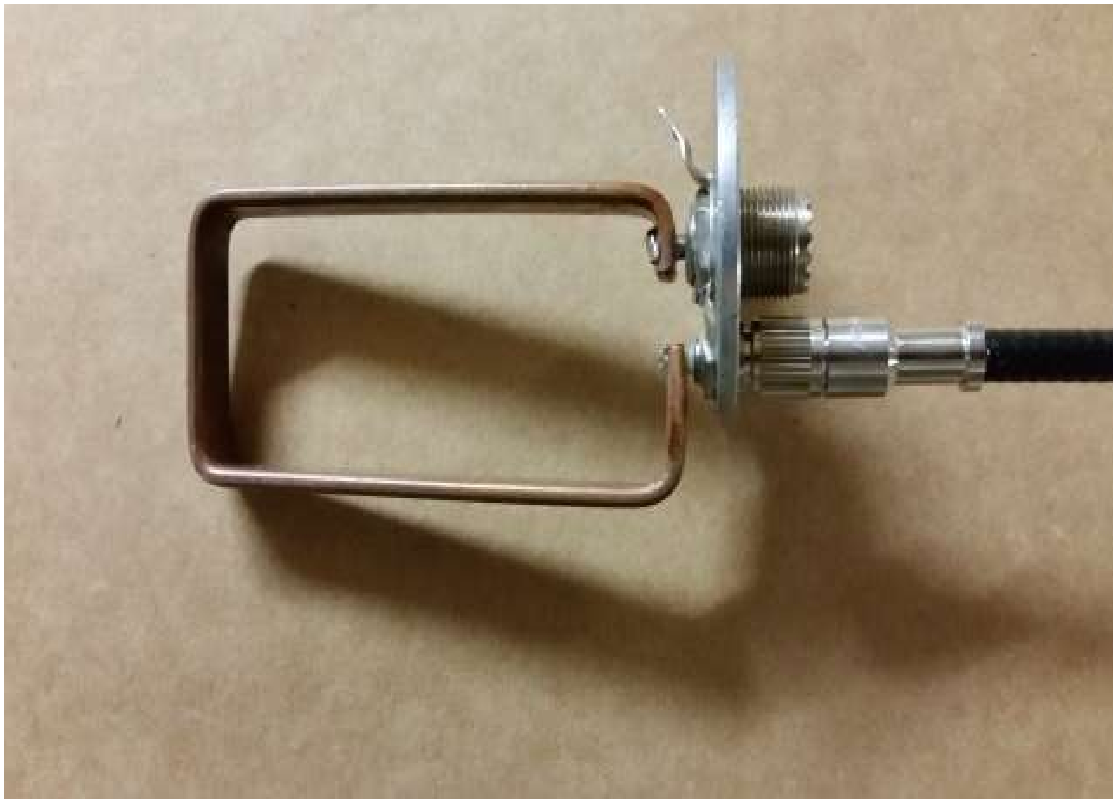
After a bit of adjusting, readjusting, and mis-adusting, it was clear the tuning capacitors for setting the notches had arced and shorted and would need to be replaced. Shouldn't be a big deal, after all, they are just capacitors. Well..... not quite so easy.



As you can see, these are not just your run of the mill capacitor. They come from the microwave world and work by the "slug" with it's concentric rings screwing down into the body with a matching set of rings in such a way that the two sets of rings never touch. For scale, the body of the part is about ¼ inch in diameter. The short observed in each of the capacitors was from ring to ring arcing and not repairable. The beginning of the challenges started with the value of the capacitors. They were not marked in any form that could be seen. Again, for reference, here is where these capacitors go. There is a copper bar inside each can at the top where the coax attaches and is part of the duplexer tuning mechanism which is rotated to adjust the coupling between the internal elements.

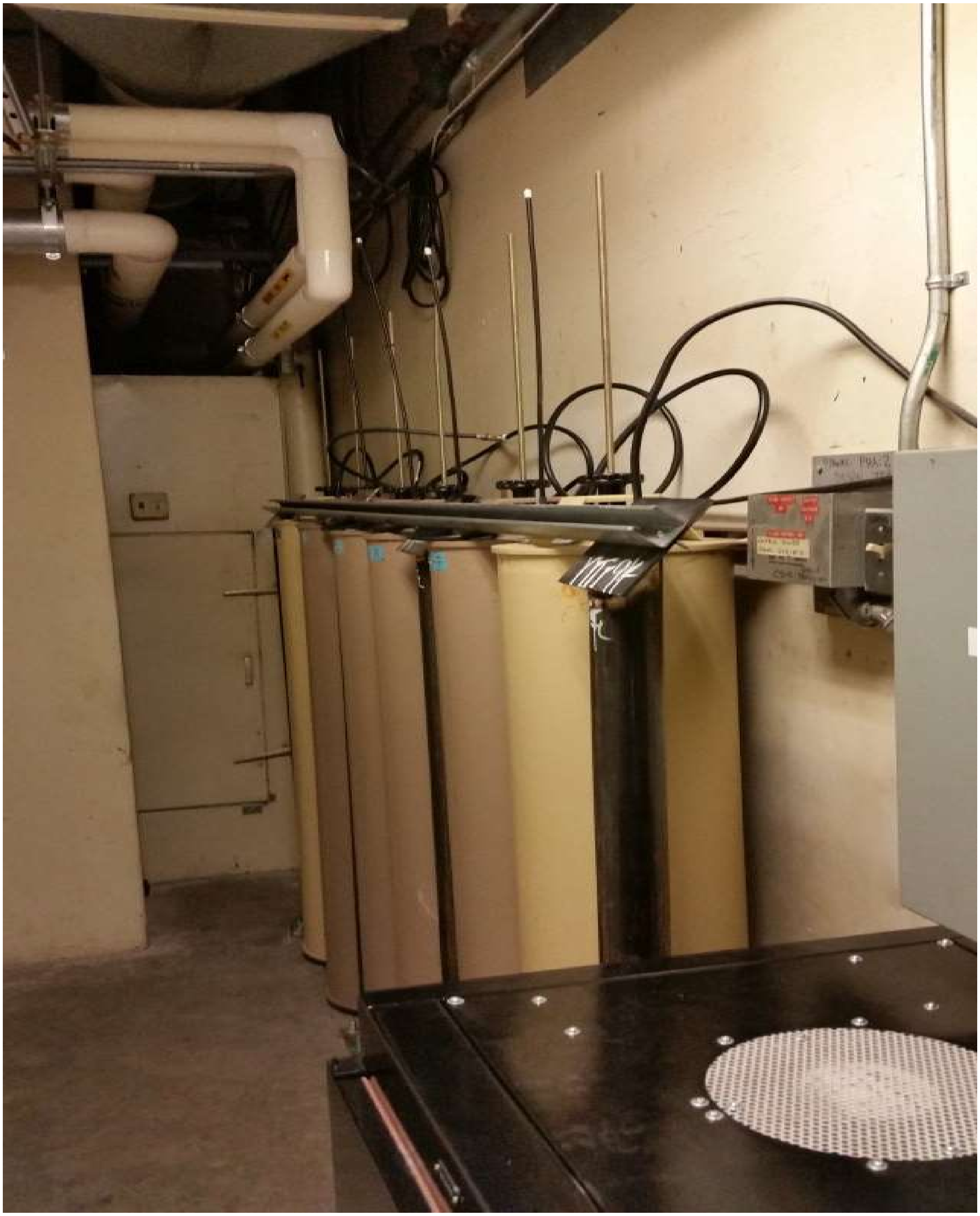


The obvious thing to do is to contact the manufacturer of the duplexer to see what the capacitors should be. As it turns out, they are no longer in business. Nor is the company that purchased the assets. Or the company after that. When I did finally get to someone that currently held the assets, I was told I should have called a few months earlier because the last guy who knew anything about our duplexers had just retired and was out sailing the oceans. So, we were on our own. After further experimentation, we determined we needed more capacitance than what we could purchase on the market. The largest value we were able to source was 30pf, but more was needed. Also, we noted the highest voltage rating we could find was 250v. OK when everything is good, not so OK when things are bad - and we were very bad. The high SWR was generating potentially thousands of volts. We tried the “just wire them in parallel” trick but that did not work as the “Q” (Q = the quality/efficiency of the capacitor.) of duplexer would fall below an acceptable level, again causing it not to function as intended. What was needed was a capacitor with high Q and enough capacitance and voltage tolerance to meet our need. After more searching, the internet handed me an article written nearly 20 years ago where a ham modified a set of duplexers similar to ours but he made his own capacitor using heliax.
The new “capacitors” now look like this which gives us the ~60pf we need.



The original capacitor was removed and replaced with a mini-uhf connector for mechanical stability in the small space allowed. The heliax is ¼ inch diameter and about 2.5 feet long. Should we ever need to, the heliax can be replaced by just unscrewing the mini-uhf and screwing on new piece (which should be very unlikely).

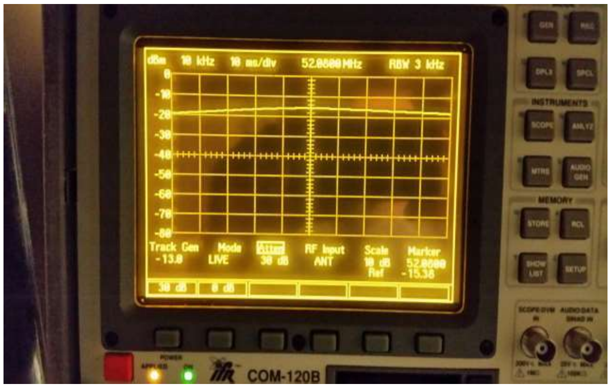
The new assembly now looks like this. You will note there are now two “rods” on each duplexer can.



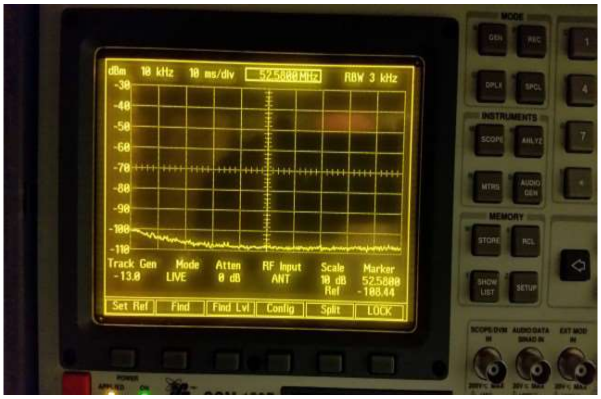
The brass rod is the actual turning rod (pass band), the black “rod” with a white cap is the new capacitor (reject notch).

Our current duplexer pass/reject values now look like this. We now have reasonable pass bands with reject frequencies of greater than -95db (beyond the measurement ability of the analyzer).

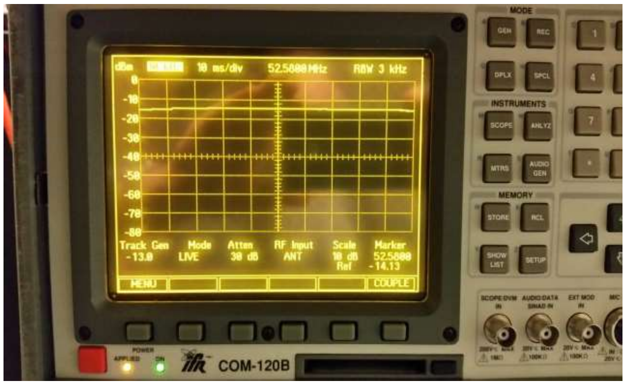
RX Pass



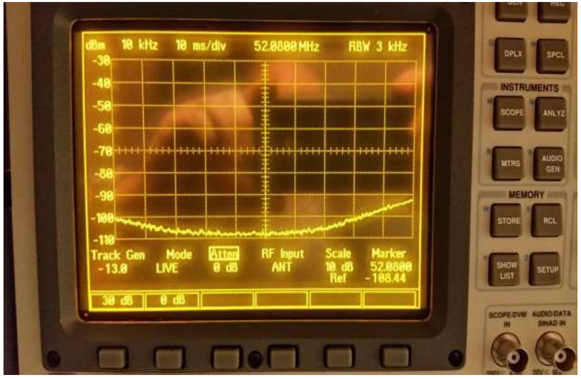
RX Reject



TX Pass



TX Reject



Thanks to Svend (KF6EMB), Chuck (AD6CL), John (NU6P), Dave (WB6KHP), and many others with which I had conversations/stole advice.
Kevin KK6VF).

Treasurer's Report - as of March 31, 2018

We're back to the slow time of the year. There were no bills to pay in March, and the only receipts were dues from 2 new members, and a payment for a club mug. Please join me in welcoming Kartikeya Gupta (KJ6TMQ) and John Burke (AJ6BJ) to WVARA. Also, Dennis Lyden (AG6HE) has renewed his membership, which won't be processed until the end of April. As the attached reports show, we have enough cash in the bank to pay bills for the rest of the year, and to maintain the repeater. The only outstanding issue is collecting for the club mugs that people ordered. If you have not yet paid for or picked up the mug you reserved, bring your payment ($12/mug) to the April meeting. Any mugs not redeemed then, may become part of the club inventory, and might be available at a higher price. I do not expect much financial activity until the flea market in August, which is good because I will be out of town a lot. If there are any club financial issues you think I've missed, please let me know at treasurer@wvara.org.

Peri Frantz
KI6SLX
WVARA Treasurer
treasurer@wvara.org

WVARA				Printed
Statement of Activity				04/08/18
January through March 2018 - 2018 Q1				
	Jan '18	Feb '18	Mar '18	TOTAL
Income				
4100 — Program Income				
4110 — Membership Dues				
4111 — Indiv. Assn. ($15)	117.00	30.00	30.00	177.00
4112 — Indiv. Repeater (12)	48.00	12.00	24.00	84.00
4113 — Fam. Assn. ($20)	100.00	0.00	0.00	100.00
4114 — Fam. Repeater ($18)	90.00	0.00	0.00	90.00
Total 4110 — Membership Dues	355.00	42.00	54.00	451.00
Total 4100 — Program Income	355.00	42.00	54.00	451.00
4200 — Misc. Income				
4210 — Mug Sales	120.00	0.00	12.00	132.00
4220 — Bank Income Earned	0.04	0.03	0.04	0.11
Total 4200 — Misc. Income	120.04	0.03	12.04	132.11
4800 — Donations	100.00	0.00	0.00	100.00
Total Income	575.04	42.03	66.04	683.11
Expense				
5100 — Administrative Expenses				
5110 — Finance Fees Paid	5.61	1.08	2.16	8.85
5140 — Web Hosting Expense	0.00	59.40	0.00	59.40
5190 — Misc. Expense	400.00	0.00	0.00	400.00
Total 5100 — Administrative Expenses	405.61	60.48	2.16	468.25
Total Expense	405.61	60.48	2.16	468.25
Net Income	169.43	-18.45	63.88	214.86

WVARA	Printed
Statement of Position	04/08/18
As of March 31, 2018	
	Mar 31, '18
ASSETS	
Current Assets	
Checking/Savings	
1000 — Financial Accounts	
1200 — Savings; BotW	4,495.53
1300 — Paypal	2,786.60
1100 — Checking; BotW	4,472.53
1399 — Petty Cash	
1910 — Petty Cash	175.23
Total 1399 — Petty Cash	175.23
Total 1000 — Financial Accounts	11,929.89
Total Checking/Savings	11,929.89
Total Current Assets	11,929.89
TOTAL ASSETS	11,929.89
LIABILITIES & EQUITY	
Equity	
3300 — Unrestricted Net Assets	
3320 — Repeater Balance	3,128.63
3310 — Associaton Balance	8,586.40
Total 3300 — Unrestricted Net Assets	11,715.03
Net Income	214.86
Total Equity	11,929.89
TOTAL LIABILITIES & EQUITY	11,929.89

2018 West Valley Amateur Radio Association Board

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Secretary: Jon Kelley, K6WV
Treasurer: Peri Frantz, KI6SLX
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Svend Jensen, KF6EMB, 2017-2018
Kevin Smith, KK6VF, 2017-2018
Chuck Kamas, AD6CL, 2018-2019
John Glass, NU6P, 2018-2019
Dave Schultheis, WB6KHP, 2018-2019

The Heterodyne is published monthly by the West Valley Amateur Radio Association and sent to all club members via the web. Please obtain permission from the author to re-publish any article in this publication.

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